Ordering number: EN 1844C

Monolithic Linear IC



No. 1844C

LA1800

FM/AM Single-Chip Radio

Functions

FM : Front end, low-pass filter, IF amp, quadrature detector, muting
AM: RF amp, detector
AF : AF driver (earphone driver)

Features

- Minimum number of external parts required: One tuning circuit each for FM, AM
- Low current dissipation: 5.6mA/FM, 3.2mA/AM
- Low-voltage operation: V_{CC} min = 2.5V

Maximum Ratings at Ta = 25°C

				unit
Maximum Supply Voltage	V_{CC} max	Pin 3	6.0	V
Allowable Power Dissipation	Pd max		200	mW
Operating Temperature	Topr		−20 to +70	°C
Storage Temperature	Tstg		−40 to +125	°C

Operating Conditions at Ta = 25°C

			unit
Recommended Supply Voltage	V_{CC}	3.0	V
Operating Voltage Range	V_{CC} op	2.5 to 5.0	V

Operating Characteristics at Ta = 25°C, V_{CC} = 3V, See Test Circuit

		min	typ	max	unit
[AM]					
Current Dissipation	Icco		3.6	5.5	mA
Pin 2 Voltage	V_2	1.9	2.4	2.9	V
Pin 14 Voltage	V_{14}	0.4	0.9	1.6	V
Pin 21 Voltage	V_{21}	0.6	0.9	1.2	V
[FM]					
Current Dissipation	Icco		5.6	8.0	mA
Pin 2 Voltage	V_2	1.9	2.6	2.9	V
Pin 4 Voltage	V_4	1.7	2.3	2.9	V
Pin 5 Voltage	V_5	1.7	2.3	2.9	V
Pin 6 Voltage	V_6	1.1	1.7	2.3	V

Continued on next page.

Pd max − Ta

Allowable Power Dissipation, Pd max − mW (0, 50, 100, 150, 200, 250, 300)
Ambient Temperature, Ta − °C (−20, 0, 20, 40, 60, 80, 100)

Package Dimensions
(unit: mm)
3059

22, 12, 1, 11, 21.2, 6.4, 7.62, 3.9 max, 3.3, 0.25, 1.78, 0.48, 0.95

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		min	typ	max	unit
Pin 7 Voltage	V_7	1.1	1.7	2.3	V
Pin 8 Voltage	V_8	1.1	1.7	2.3	V
Pin 9 Voltage	V_9	1.9	2.6	2.9	V
Pin 10 Voltage	V_{10}	1.8	2.5	2.9	V
Pin 13 Voltage	V_{13}		0	0.6	V
Pin 14 Voltage	V_{14}	0.5	1.0	1.7	V
Pin 16 Voltage	V_{16}	1.6	2.3	2.9	V
Pin 17 Voltage	V_{17}	1.6	2.3	2.9	V
Pin 19 Voltage	V_{19}	0.6	0.86	1.4	V
Pin 20 Voltage	V_{20}	0.6	0.86	1.4	V
[AF]					
Pin 11 Current	I_{11}	0.5	1.0	1.5	mA
Pin 12 Voltage	V_{12}		0	0.5	V

[Reference Characteristics]

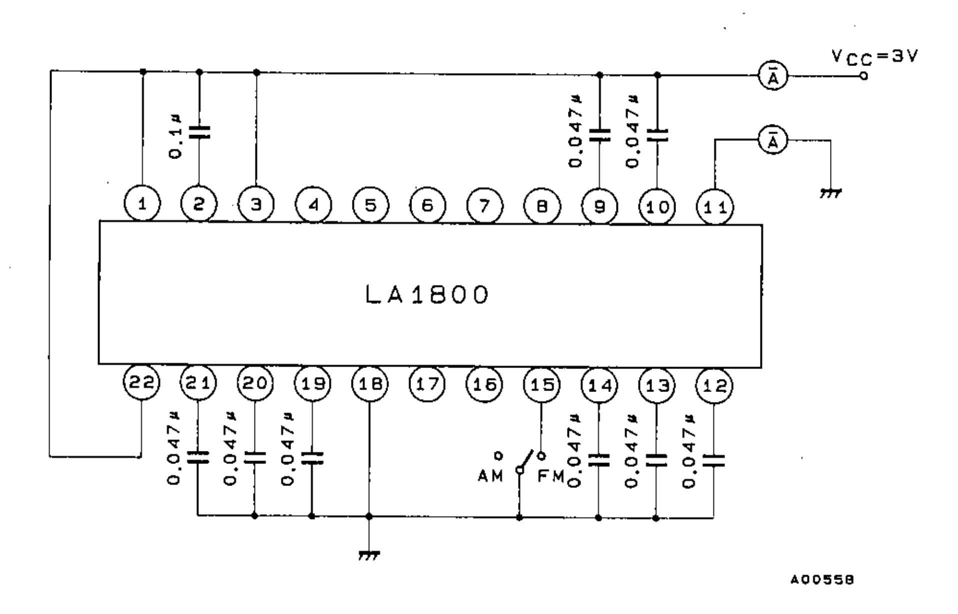
Operating Characteristics at Ta = 25°C, V_{CC} = 3V, See Test Circuit 2

			typ	unit
[AM : f_C = 1MHz, fm = 400Hz]				
Current Dissipation	Icco	Quiescent	3.6	mA
Detection Output	$V_O(1)$	Vi = 40dBμ, 30% mod	10	mV
	$V_O(2)$	Vi = 70dBμ, 30% mod	100	mV
Signal to Noise Ratio	S/N	Vi = 70dBμ, 30% mod	47	dB
[FM : f_C = 90MHz, fm = 400Hz]				
Current Dissipation	Icco	Quiescent	5.6	mA
Input Limiting Sensitivity	−3dBL.S.	3dB down, 30% mod	16	dBμ
Demodulation Output	V_O	Vi = 80dBμ, 30% mod	90	mV
Total Harmonic Distortion	THD	Vi = 80dBμ, 30% mod	0.8	%
Signal to Noise Ratio	S/N	Vi = 80dBμ	59	dB
[AF : fm = 400Hz]				
Voltage Gain	VG	V_O = 50mV	24	dB
Total Harmonic Distortion	THD	V_O = 50mV	0.3	%

Note1 : Current dissipation for FM, AM includes current of AF driver stage.
Note2 : When handling the IC, be careful not to cause dielectric breakdown.

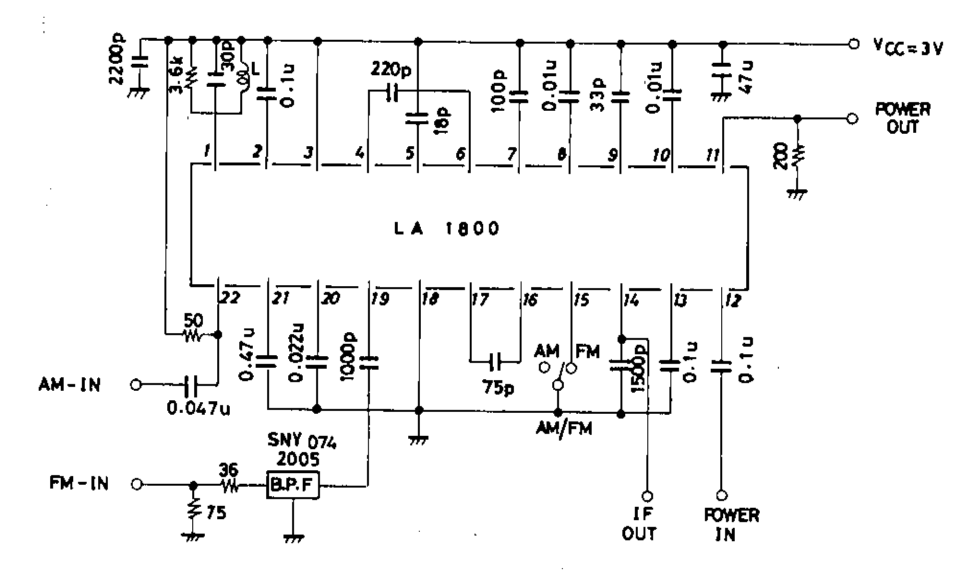
DC Test Circuit

Unit (capacitance: F)

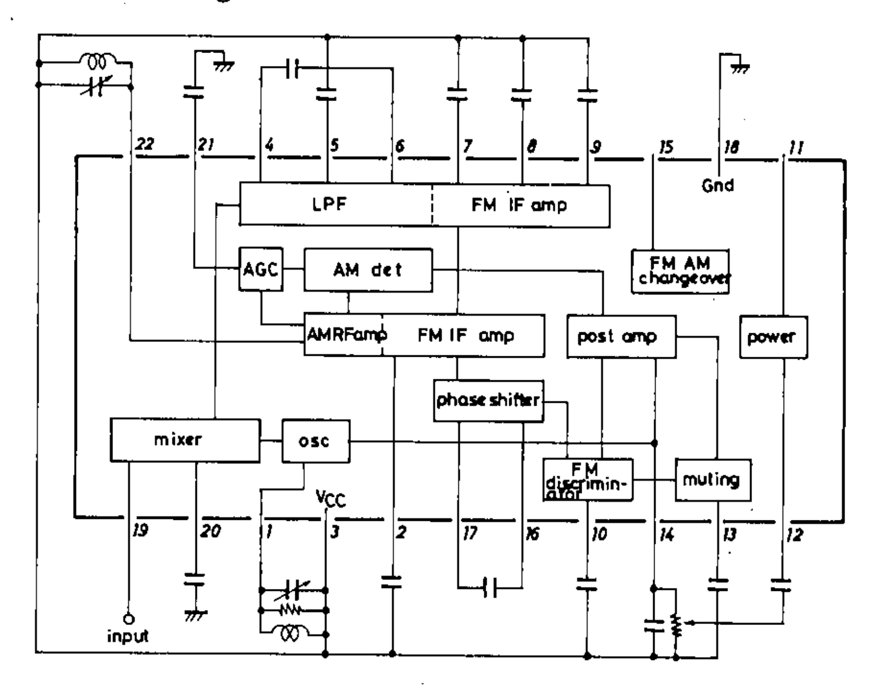


AC Test Circuit

Unit (resistance: Ω, capacitance: F)

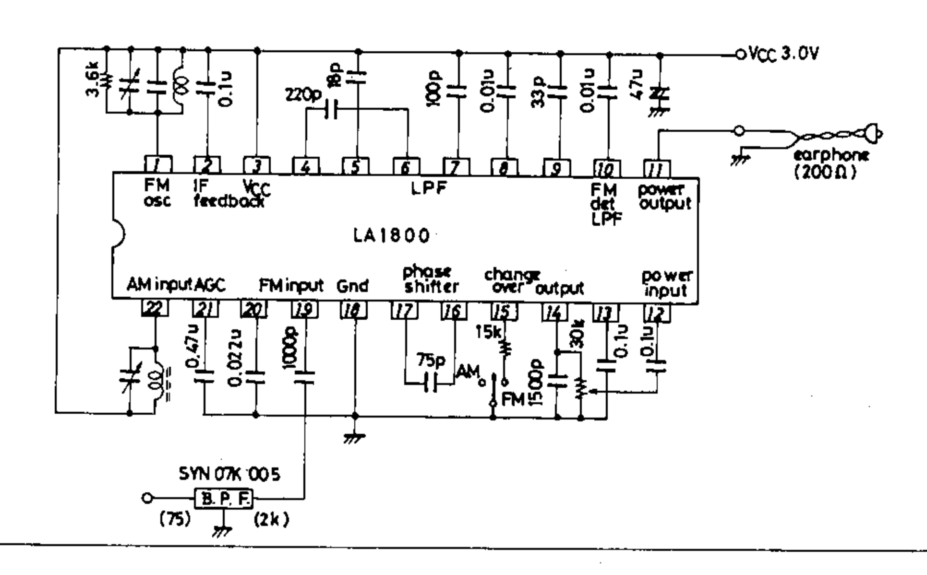


Equivalent Circuit Block Diagram



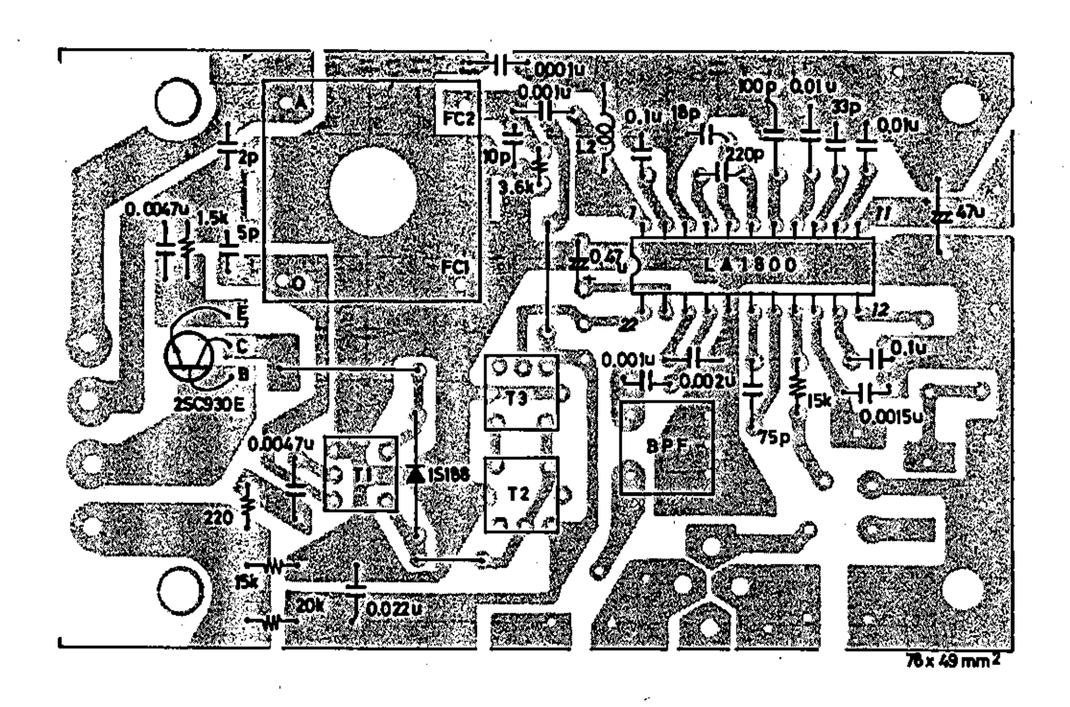
Sample Application Circuit

Unit (resistance: Ω, capacitance: F)



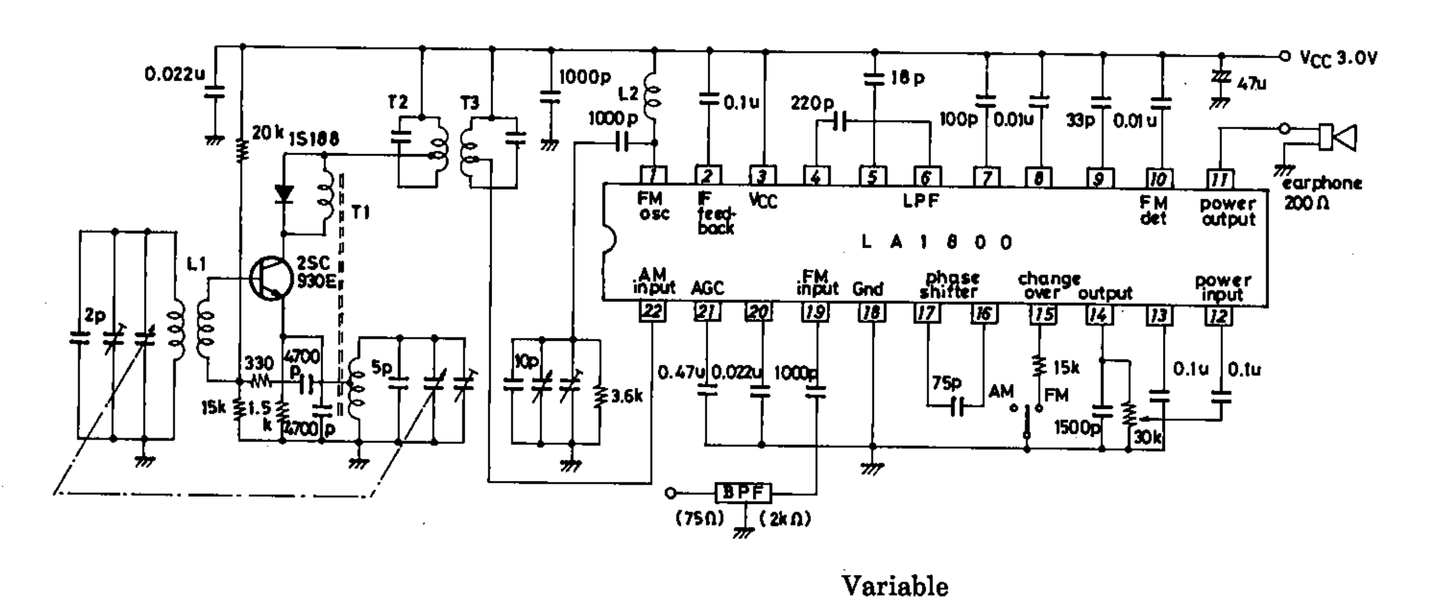
Sample Printed Circuit Pattern (Cu-foiled side)

Unit (resistance: Ω, capacitance: F)

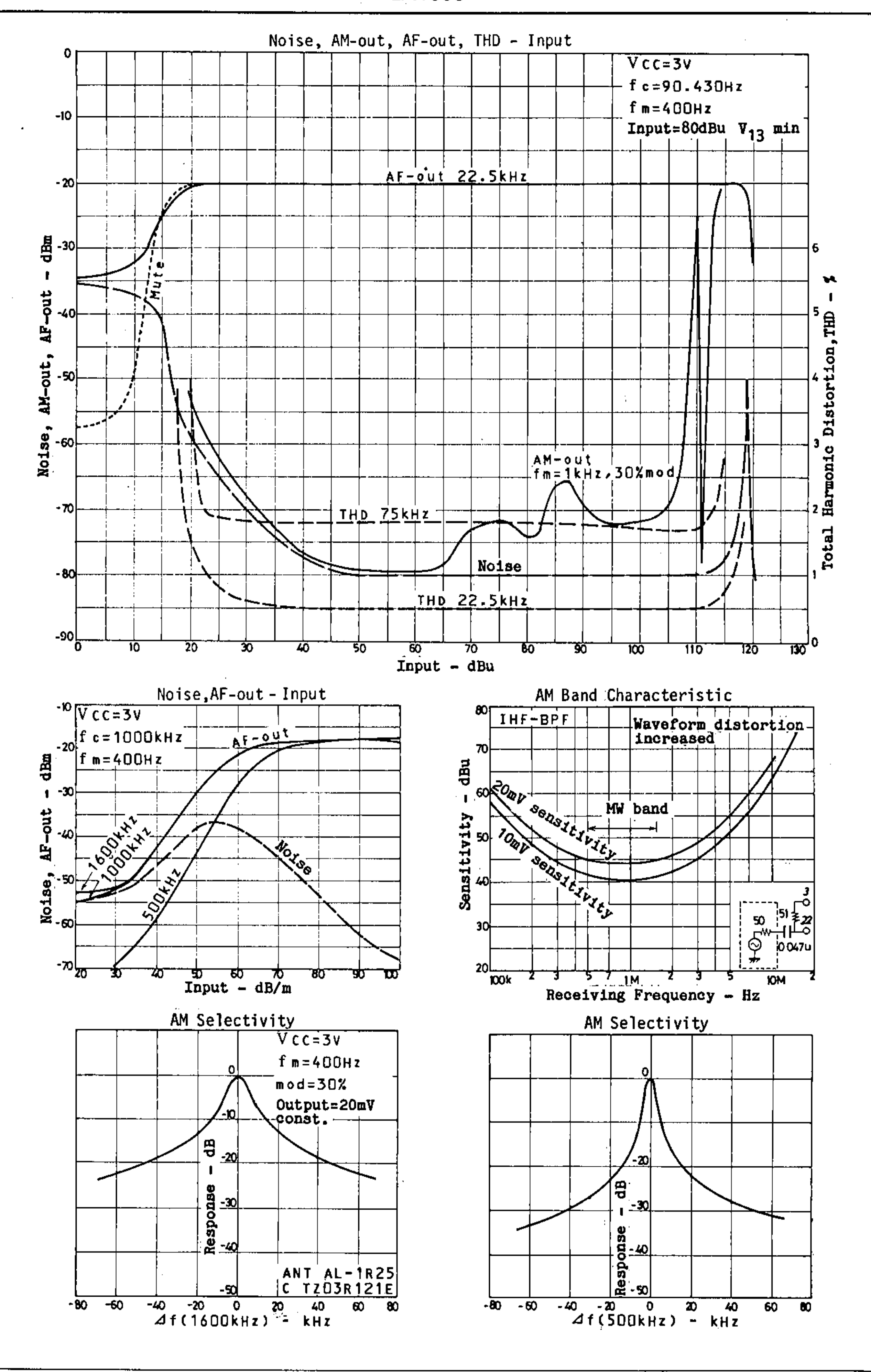


MW Superheterodyne Use

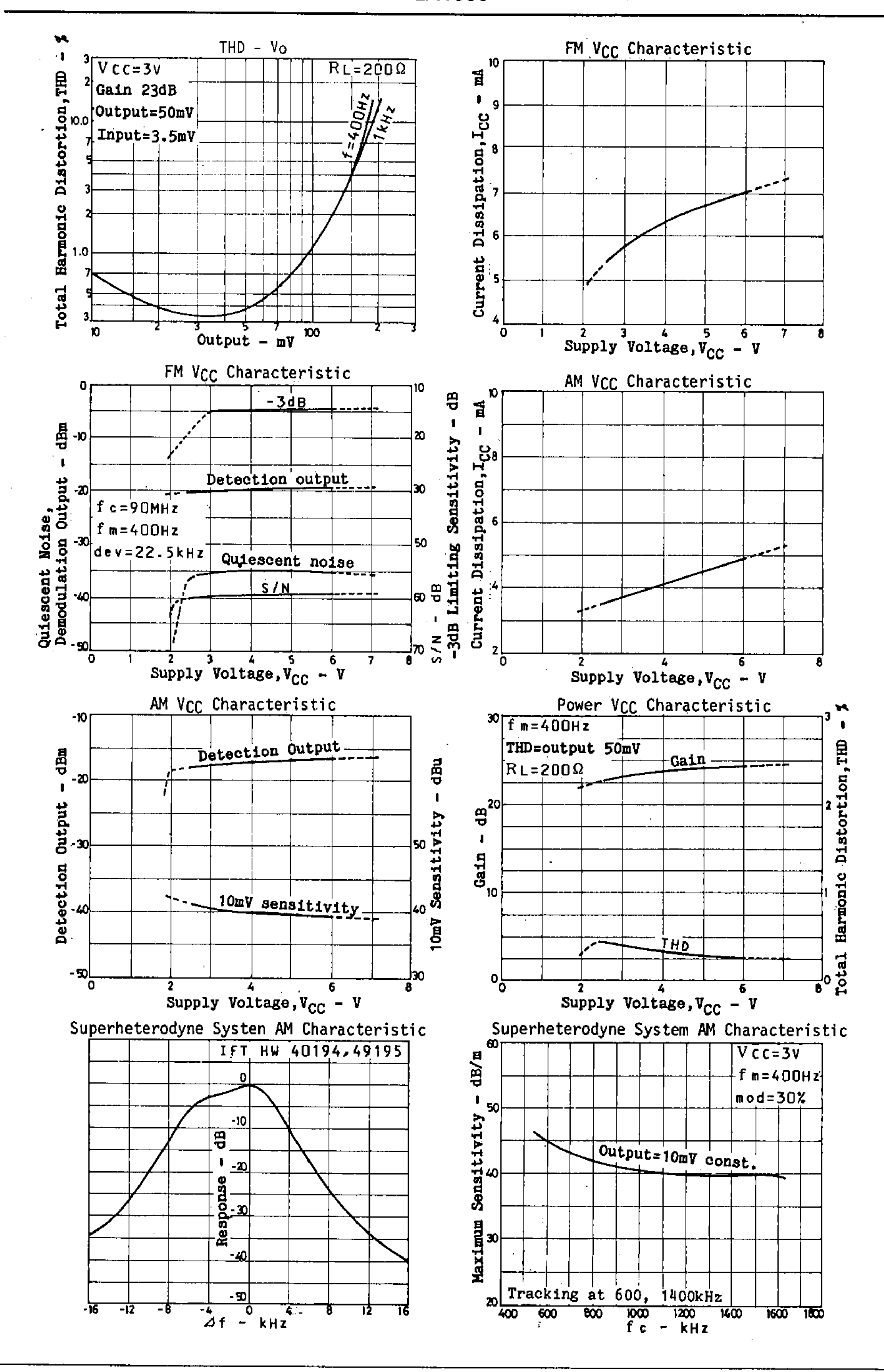
Unit (resistance: Ω, capacitance: F)

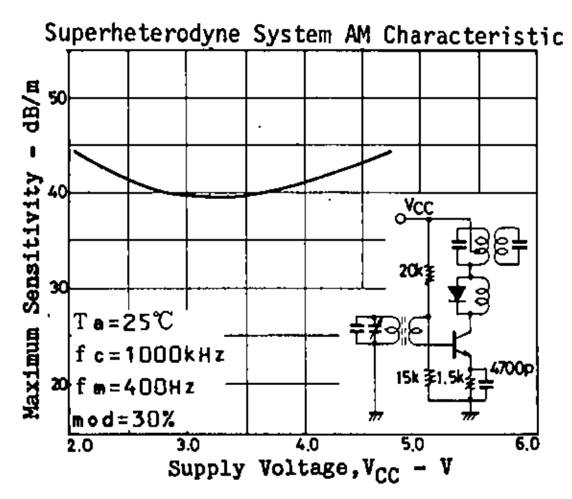


Variable capacitor	2LXT-L	Mitsumi
L1	HH-40947	Mitsumi
T1	HW-40217	Mitsumi
T2	HW-40194	Mitsumi
T3	HW-50005	Mitsumi
B.P.F	SNY-074-2005	Sumida

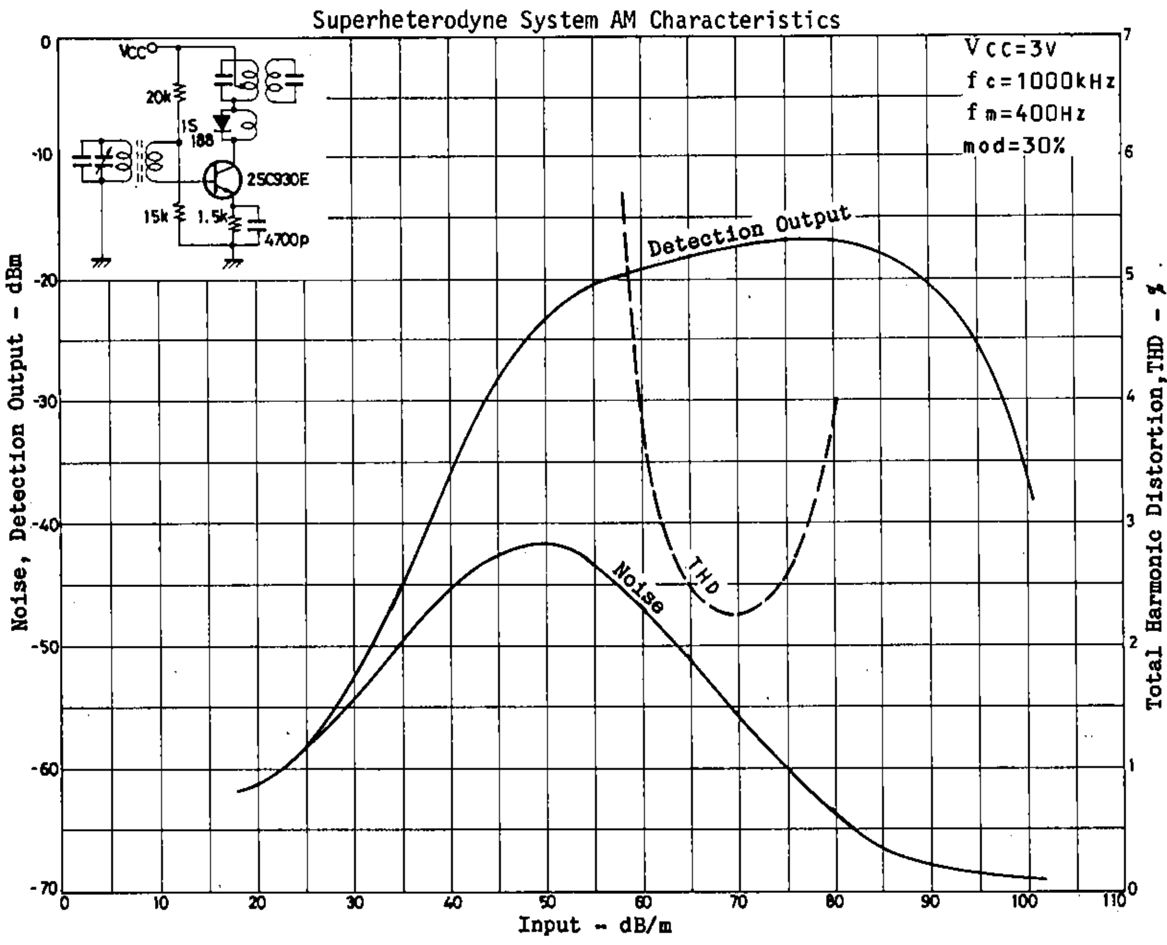


Noise, AM-out, AF-out, THD - Input
Vcc=3V
fc=90.430Hz
fm=400Hz
Input=80dBu V13 min
AF-out 22.5kHz
Mute
AM-out
fm=1kHz,30%mod
THD 75kHz
Noise
THD 22.5kHz
Noise, AM-out, AF-out - dBm
Total Harmonic Distortion,THD - %
Input - dBu
Noise,AF-out - Input
Vcc=3V
fc=1000kHz
fm=400Hz
AF-out
1600kHz
1000kHz
500kHz
Noise
Noise, AF-out - dBm
Input - dB/m
AM Band Characteristic
IHF-BPF
Waveform distortion increased
MW band
20mV sensitivity
10mV sensitivity
Sensitivity - dBu
Receiving Frequency - Hz
AM Selectivity
Vcc=3V
fm=400Hz
mod=30%
Output=20mV const.
ANT AL-1R25
C TZ03R121E
Response - dB
Δf(1600kHz) - kHz
AM Selectivity
Response - dB
Δf(500kHz) - kHz


THD - Vo
Vcc=3V
Gain 23dB
Output=50mV
Input=3.5mV
RL=200Ω
f=400Hz
1kHz
Total Harmonic Distortion,THD - %
Output - mV
FM Vcc Characteristic
Current Dissipation,Icc - mA
Supply Voltage,Vcc - V
FM Vcc Characteristic
-3dB
Detection output
fc=90MHz
fm=400Hz
dev=22.5kHz
Quiescent noise
S/N
Quiescent Noise, Demodulation Output - dBm
S/N - dB
-3dB Limiting Sensitivity - dB
Supply Voltage,Vcc - V
AM Vcc Characteristic
Current Dissipation,Icc - mA
Supply Voltage,Vcc - V
AM Vcc Characteristic
Detection Output
10mV sensitivity
Detection Output - dBm
10mV Sensitivity - dBu
Supply Voltage,Vcc - V
Power Vcc Characteristic
fm=400Hz
THD=output 50mV
RL=200Ω
Gain
THD
Gain - dB
Total Harmonic Distortion,THD - %
Supply Voltage,Vcc - V
Superheterodyne Systen AM Characteristic
IFT HW 40194,49195
Response - dB
Δf - kHz
Superheterodyne System AM Characteristic
Vcc=3V
fm=400Hz
mod=30%
Output=10mV const.
Tracking at 600, 1400kHz
Maximum Sensitivity - dB/m
fc - kHz



Superheterodyne System AM Characteristic
Maximum Sensitivity - dB/m
50
40
30
20
Ta=25℃
fc=1000kHz
fm=400Hz
mod=30%
VCC
20k
15k
1.5k
4700p
2.0
3.0
4.0
5.0
6.0
Supply Voltage, VCC - V



Superheterodyne System AM Characteristics
VCC=3V
fc=1000kHz
fm=400Hz
mod=30%
VCC
20k
1S 188
2SC930E
15k
1.5k
4700p
Detection Output
THD
Noise
Noise, Detection Output - dBm
0
-10
-20
-30
-40
-50
-60
-70
Total Harmonic Distortion, THD - %
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
110
Input - dB/m